New England Common Assessment Program

Released Items 2007

Grade 6 Mathematics

Mathematics

Item selected from Session One—no calculators or other mathematics tools allowed.

1 Which number has the same value as 6 hundred thousands and 23 hundreds?

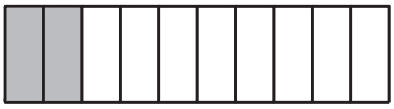
A. 6,002,300
B. 623,000
C. 602,300
D. 600,230

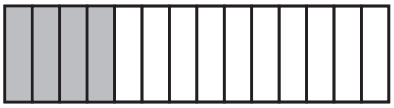
2 This rectangle is shaded gray to represent 1.

Which rectangle is shaded gray to represent 0.4?

A. 

B. 

C. 

D. 

3 This square is shaded gray to represent the part of Gibson's land that is covered with trees.

Gibson's Land

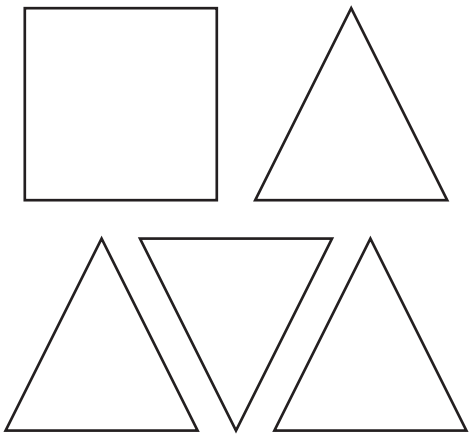
About what percent of Gibson's land is covered with trees?

A. between 10% and 25%
B. between 25% and 50%
C. between 50% and 75%
D. between 75% and 100%

4 Trisha has a job walking 16 dogs for her neighbors. She can walk one, two, or three dogs on each trip to the park. What is the fewest number of trips Trisha takes to walk all 16 dogs?

A. 16
B. 15
C. 6
D. 5

5 These shapes are the 5 faces of a three-dimensional figure.



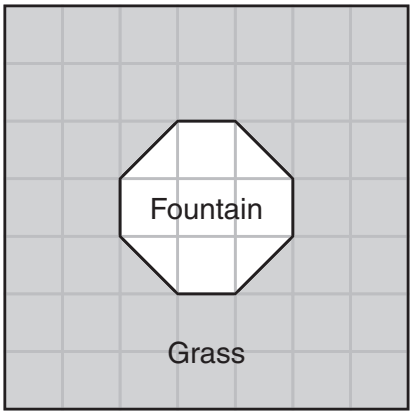
What is the three-dimensional figure?

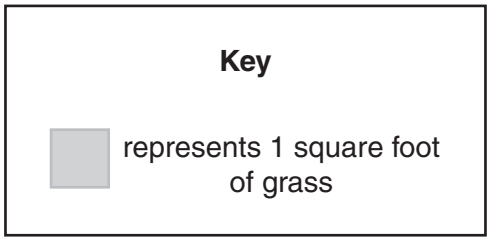
A. cube
B. cone
C. prism
D. pyramid

6 Juan made cones and cylinders out of paper. He cut a total of 10 circles for the bases. Juan made 4 cones. How many cylinders did he make?

A. 1
B. 2
C. 3
D. 6

7 Look at this picture.





What is the area of the grass around the fountain?

A. 46 square feet
B. 44 square feet
C. 42 square feet
D. 40 square feet

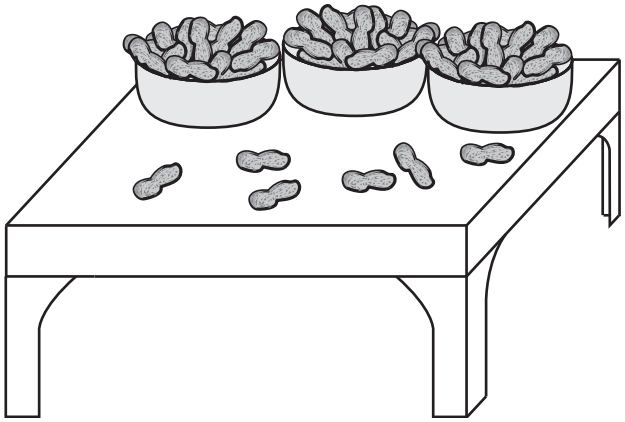
8 Look at this equation.

$$18 = 3d - 6$$

What value of d makes the equation true?

A. 12
B. 8
C. 6
D. 4

9 There is a total of 75 peanuts in the bowls and on the table shown below.



There is the same number of peanuts in each bowl. How many peanuts are in each bowl?

A. 12
B. 19
C. 23
D. 27

10 A yoga teacher collected data on the ages of the people in her class.

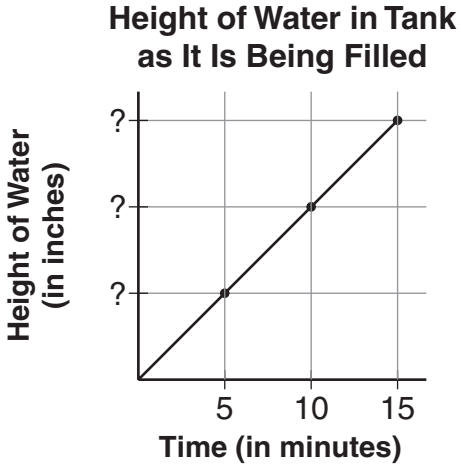
- The median is 36 years old.
- The mean is 42 years old.
- The mode is 50 years old.

Which statement **must** be true?

A. Most people in the class are 42 years old.
B. The oldest person in the class is 50 years old.
C. Each person in the class is either 36, 42, or 50 years old.
D. At least half of the people in the class are 36 years old or younger.

11 A square garden has an area of 49 square feet. What is the **perimeter**, in feet, of the garden?

12 The line graph below shows the height of the water in a water tank as it fills. The numbers representing the heights of the water are missing.



The height of the water in the tank increases at a rate of 4 inches per minute as the tank fills. What are the three missing numbers?

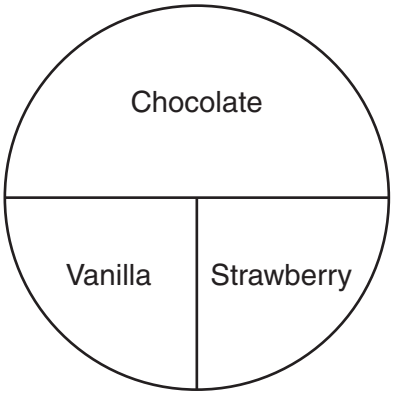
13 Look at this pattern.

Step 1	Step 2	Step 3	Step 4
			
5 dots	8 dots	11 dots	14 dots

How many dots will be used in Step 20? Show your work or explain how you know.

14 The 24 students in Mr. Allen's class voted on which flavor of ice cream they liked the best. Each student voted for one flavor. The circle graph below compares the number of votes each flavor received.

Ice-Cream Flavor Votes



How many students voted for each flavor? Show your work or explain how you know.

15 The chart below shows the average rainfall in April for four different towns.

Average Rainfall in April

Town	Average Rainfall (in inches)
Fairview	3.35
Milton	4.20
Crawford	3.98
Southport	4.09

a. Which town had the greatest average rainfall?

b. How much more is the average rainfall in Southport than the average rainfall in Fairview? Show your work or explain how you know.

c. The **actual** April rainfall in Fairview this year was 0.8 inch **more than** the average rainfall. What was the actual April rainfall in Fairview? Show your work or explain how you know.

Grade 6 Mathematics Released Item Information

Released Item Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
No Tools Allowed	✓	✓					✓	✓		✓				✓	✓
Content Strand[1]	NO	NO	NO	NO	GM	GM	GM	FA	FA	DP	GM	DP	FA	DP	NO
GLE Code	5-1	5-1	5-2	5-3	5-3	5-3	5-6	5-4	5-4	5-2	5-6	5-3	5-1	5-1	5-4
Depth of Knowledge Code	1	2	2	2	1	2	2	1	2	2	2	2	3	2	2
Item Type[2]	MC	MC	MC	MC	MC	MC	MC	MC	MC	MC	SA	SA	SA	SA	CR
Answer Key	C	B	B	C	D	C	C	B	C	D					
Total Possible Points	1	1	1	1	1	1	1	1	1	1	1	1	2	2	4

[1]Content Strand: NO = Numbers & Operations, GM = Geometry & Measurement, FA = Functions & Algebra, DP = Data, Statistics, & Probability

[2]Item Type: MC = Multiple Choice, SA = Short Answer, CR = Constructed Response

New England Common Assessment Program

Released Items Support Materials 2007

Grade 6 Mathematics

N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

1 Which number has the same value as 6 hundred thousands and 23 hundreds?

A. 6,002,300
B. 623,000
C. 602,300
D. 600,230

N&O 5.1 **Demonstrates conceptual understanding of rational numbers with respect to: whole numbers** from 0 to 9,999,999 through equivalency, composition, decomposition, or place value **using models, explanations, or other representations**; and **positive fractional numbers** (proper, mixed number, and improper) (halves, fourths, eighths, thirds, sixths, twelfths, fifths, or powers of ten (10, 100, 1000)), **decimals** (to thousandths), or **benchmark percents** (10%, 25%, 50%, 75% or 100%) as a part to whole relationship in area, set, or linear models **using models, explanations, or other representations**.

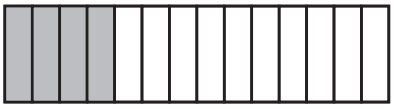
2 This rectangle is shaded gray to represent 1.

Which rectangle is shaded gray to represent 0.4?

A. 

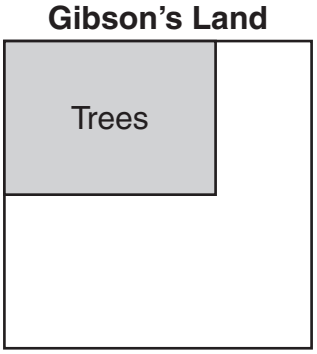
B. 

C. 

D. 

N&O 5.2 **Demonstrates understanding of the relative magnitude of numbers** by ordering, comparing, or identifying equivalent positive fractional numbers, decimals, or benchmark percents within number formats (fractions to fractions, decimals to decimals, or percents to percents); or integers in context using models or number lines.

3 This square is shaded gray to represent the part of Gibson's land that is covered with trees.



About what percent of Gibson's land is covered with trees?

A. between 10% and 25%
B. between 25% and 50%
C. between 50% and 75%
D. between 75% and 100%

N&O 5.3 **Demonstrates conceptual understanding of mathematical operations** by describing or illustrating the meaning of a remainder with respect to division of whole numbers using models, explanations, or solving problems.

4 Trisha has a job walking 16 dogs for her neighbors. She can walk one, two, or three dogs on each trip to the park. What is the fewest number of trips Trisha takes to walk all 16 dogs?

A. 16

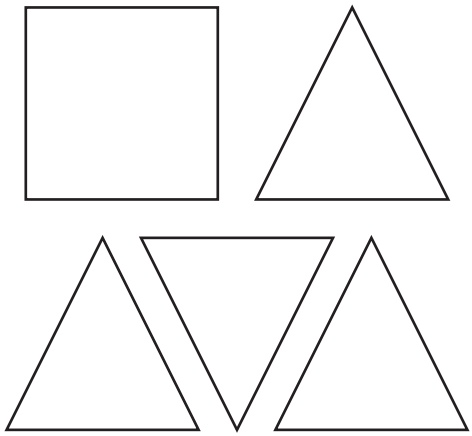
B. 15

C. 6

D. 5

G&M 5.3 **Uses properties or attributes** (shape of bases, number of lateral faces, or number of bases) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

5 These shapes are the 5 faces of a three-dimensional figure.



What is the three-dimensional figure?

A. cube
B. cone
C. prism
D. pyramid

G&M 5.3 **Uses properties or attributes** (shape of bases, number of lateral faces, or number of bases) **to identify, compare, or describe three-dimensional shapes** (rectangular prisms, triangular prisms, cylinders, spheres, pyramids, or cones).

6 Juan made cones and cylinders out of paper. He cut a total of 10 circles for the bases. Juan made 4 cones. How many cylinders did he make?

A. 1

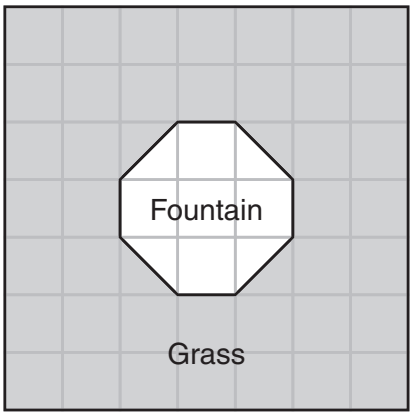
B. 2

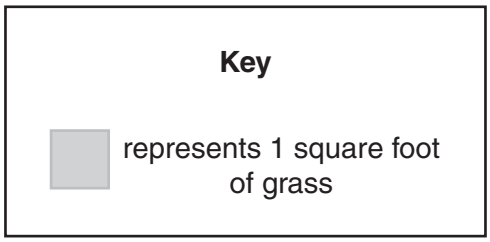
C. 3

D. 6

G&M 5.6 **Demonstrates conceptual understanding of perimeter** of polygons, **and the area of** rectangles or right triangles through models, manipulatives, or formulas, the area of polygons or irregular figures on grids, **and volume of** rectangular prisms (cubes) using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.

7 Look at this picture.





What is the area of the grass around the fountain?

A. 46 square feet
B. 44 square feet
C. 42 square feet
D. 40 square feet

F&A 5.4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–5–3), by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, or $x/a = c$, where a, b, and c are whole numbers with $a \neq 0$; or by determining which values of a replacement set make the equation (multi-step of the form $ax \pm b = c$ where a, b, and c are whole numbers with $a \neq 0$) a true statement (e.g., $2x + 3 = 11$, $\{x: x = 2, 3, 4, 5\}$).

8 Look at this equation.

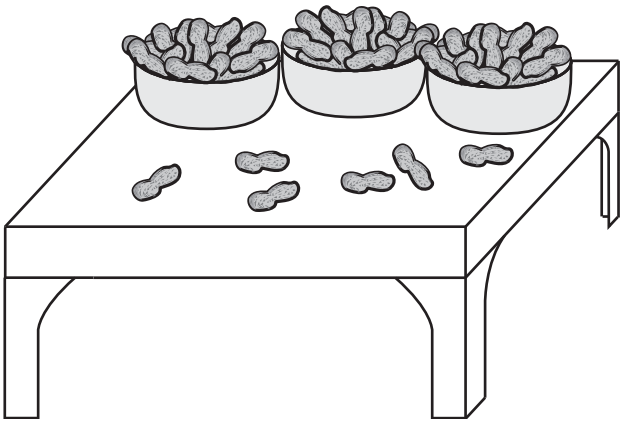
$$\mathbf{18 = 3}\boldsymbol{d}\mathbf{ - 6}$$

What value of d makes the equation true?

A. 12
B. 8
C. 6
D. 4

F&A 5.4 **Demonstrates conceptual understanding of equality** by showing equivalence between two expressions using models or different representations of the expressions (expressions consistent with the parameters of M(F&A)–5–3), by solving one-step linear equations of the form $ax = c$, $x \pm b = c$, or $x/a = c$, where a, b, and c are whole numbers with $a \neq 0$; or by determining which values of a replacement set make the equation (multi-step of the form $ax \pm b = c$ where a, b, and c are whole numbers with $a \neq 0$) a true statement (e.g., $2x + 3 = 11$, $\{x: x = 2, 3, 4, 5\}$).

9 There is a total of 75 peanuts in the bowls and on the table shown below.



There is the same number of peanuts in each bowl. How many peanuts are in each bowl?

A. 12

B. 19

C. 23

D. 27

DSP 5.2 **Analyzes patterns, trends, or distributions in data in a variety of contexts by determining or using** measures of central tendency (mean, median, or mode) or range to analyze situations, or to solve problems.

10 A yoga teacher collected data on the ages of the people in her class.

- The median is 36 years old.
- The mean is 42 years old.
- The mode is 50 years old.

Which statement **must** be true?

A. Most people in the class are 42 years old.

B. The oldest person in the class is 50 years old.

C. Each person in the class is either 36, 42, or 50 years old.

D. At least half of the people in the class are 36 years old or younger.

G&M 5.6 **Demonstrates conceptual understanding of perimeter** of polygons, **and the area of** rectangles or right triangles through models, manipulatives, or formulas, the area of polygons or irregular figures on grids, **and volume of** rectangular prisms (cubes) using a variety of models, manipulatives, or formulas. Expresses all measures using appropriate units.

11 A square garden has an area of 49 square feet. What is the **perimeter**, in feet, of the garden?

Scoring Guide

Score	Description
1	Student gives the correct perimeter, **28**.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured. Note: The correct unit is not required since the unit is given in the problem. If student gives an incorrect unit, the score is zero.
Blank	No response

Score Point 1
(Example A)

11

Perimeter = 28 Feet

Student's answer is correct. (The unit is not required.)

Score Point 1
(Example B)

11

28 ~~Feet~~ is the perimeter

28 =

Student's answer is correct. (Showing work and stating the unit are not required.)

SCORE POINT 0
(EXAMPLE A)

11

7 feet by 7 feet

Student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)

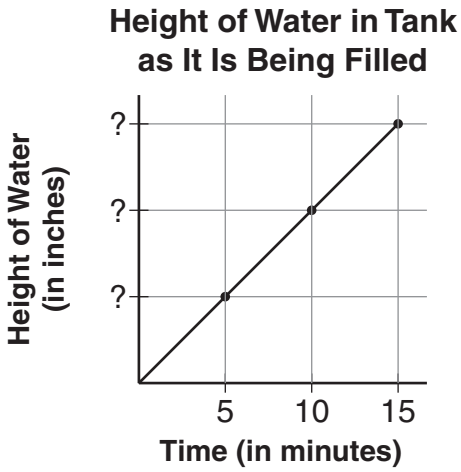
11

$\begin{array}{r} 7 \\ \times 4 \\ \hline 28 \end{array}$ 28 ft.²

Student's answer is incorrect.
(The unit is incorrect.)

DSP 5.3 **Identifies or describes representations or elements of representations that best display a given set of data or situation**, consistent with the representations required in M(DSP)–5–1.

12 The line graph below shows the height of the water in a water tank as it fills. The numbers representing the heights of the water are missing.



The height of the water in the tank increases at a rate of 4 inches per minute as the tank fills. What are the three missing numbers?

Scoring Guide

Score	Description
1	Student gives the correct missing numbers, **20, 40, 60 or 60, 40, 20.**
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

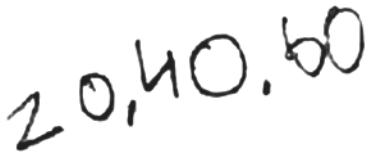
Score Point 1
(Example A)

12

Student's answer is correct (Showing work is not required.)

Score Point 1
(Example B)

12



Student's answer is correct.

SCORE POINT 0
(EXAMPLE A)

⓬

5x4=20
4x10=40
4x15=65

Student's answer is incorrect.

SCORE POINT 0
(EXAMPLE B)

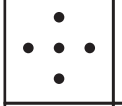
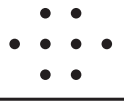
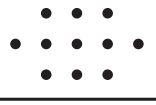
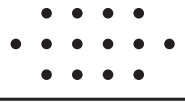
⓬

20 inches in 5 minutes. So
60 in 15 minutes

Student's answer is incomplete.

F&A 5.1 **Identifies and extends to specific cases a variety of patterns** (linear and nonlinear) represented in models, tables, sequences, or in problem situations; and writes a rule in words or[sc] symbols for finding specific cases of a linear relationship.

13 Look at this pattern.

Step 1	Step 2	Step 3	Step 4
			
5 dots	8 dots	11 dots	14 dots

How many dots will be used in Step 20? Show your work or explain how you know.

Scoring Guide

Score	Description
2	Student gives or shows the correct answer, **62**, and provides appropriate work or explanation that describes the rule of the pattern.
1	Student gives correct answer but does not provide sufficient explanation. OR Student's work or explanation shows correct strategy in solving the problem.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Responses:

The picture in Step 20 would have 3 rows of 20 dots each plus 1 dot at each end. This is a total of 3 x 20 + 1 x 2 = 62.

OR

Add three to five nineteen times. This gives a total of 5 + 3 x 19 = 5 + 57 = 62.

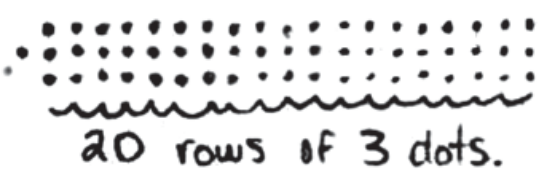
OR

Student shows correct pattern for step 20.

Score Point 2
(Example A)

13

Each picture adds one vertical line of three dots in the middle, but the end dots stay the same. There will be 62 dots in step 20.



20×3+2=62

Student's answer is correct, with correct strategy shown. (Note: The student's diagram shows only 19 columns of dots, but the annotation shows correct numbers.)

Score Point 2
(Example B)

13

62

$$\begin{array}{r} {\scriptstyle 1} \\ 48 \\ +\ 14 \\ \hline 62 \end{array}$$

$$\begin{array}{r} 16 \\ \times\ 3 \\ \hline 48 \end{array}$$

Student's answer is correct, with correct strategy shown.

SCORE POINT 2
(EXAMPLE C)

13

Student shows the correct Step 20, with the correct number of dots.

Score Point 1
(Example A)

13

62 because you add 3 every step.

Student's answer is correct, with insufficient explanation given. (The student does not clearly indicate the starting point for the pattern or the number of times that 3 was added.)

Score Point 1
(Example B)

13

62

Student's answer is correct, with no explanation given or work shown.

Score Point 0
(Example A)

⓭

Add 3

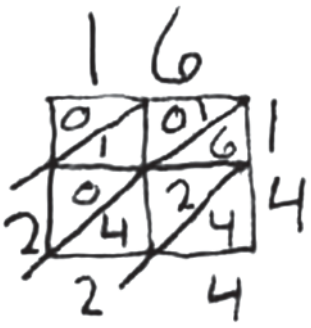
5 dots = Step 1 20 step
5 dots
100

there will be 100 dots in step 20.

Student's answer is incorrect, with incorrect strategy shown. (Note: "Add 3" is a partially correct strategy, but student does not apply that strategy.)

Score Point 0
(Example B)

⓭



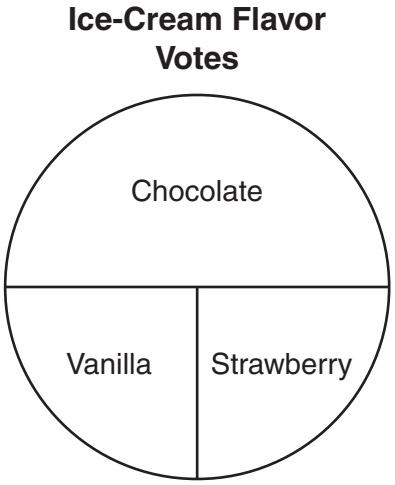
= answer 224 dots

Student's answer is incorrect, with incorrect strategy shown.

DSP 5.1 **Interprets a given representation** (tables, bar graphs, circle graphs, or line graphs) to answer questions related to the data, to analyze the data to formulate or justify conclusions, to make predictions, or to solve problems.

(IMPORTANT: *Analyzes data consistent with concepts and skills in M(DSP)-5-2* .)

14 The 24 students in Mr. Allen's class voted on which flavor of ice cream they liked the best. Each student voted for one flavor. The circle graph below compares the number of votes each flavor received.



How many students voted for each flavor? Show your work or explain how you know.

Scoring Guide

Score	Description
2	Student gives correct answer, **12** students voted for **chocolate**, **6** students voted for **vanilla**, and **6** students voted for **strawberry**, with work shown or explanation given.
1	Student gives (all three) correct answers but shows no work or explanation. OR Student's work or explanation shows correct strategy in solving the problem, but there is a computation error. OR Student indicates 50% of the students voted for chocolate, 25% of the students voted for vanilla, and 25% of the students voted for strawberry.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Sample Responses:

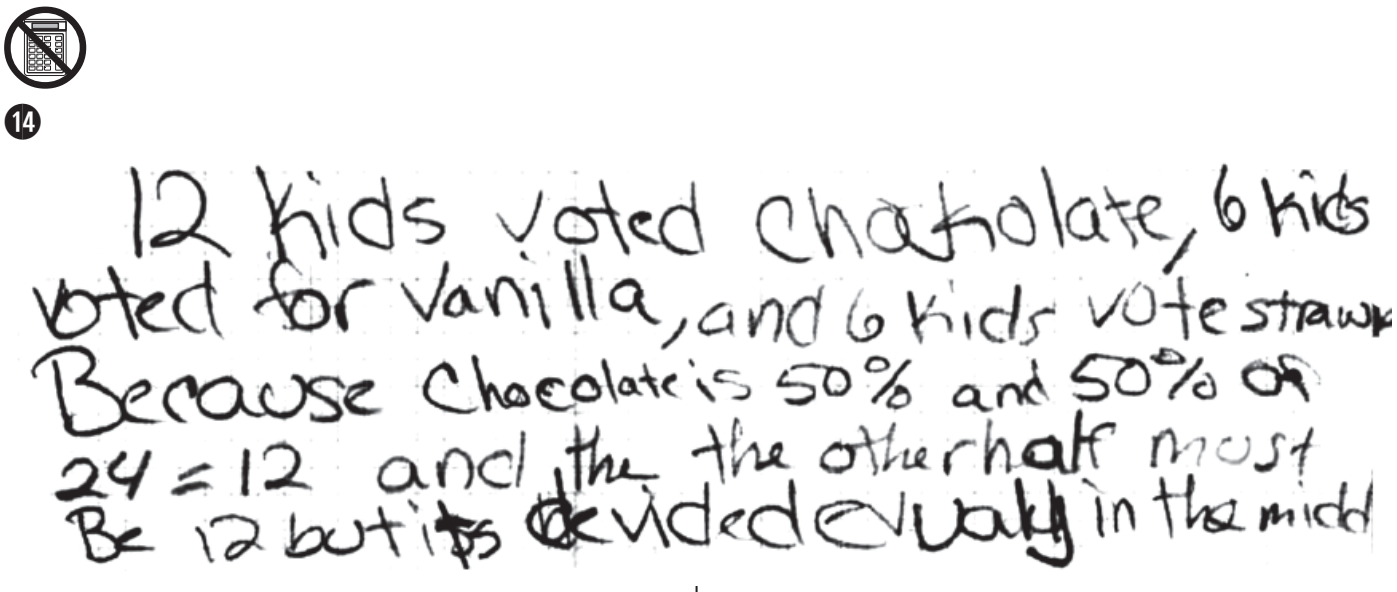
$\frac{1}{2}$ of the students like chocolate best. $\frac{1}{2}$ of 24 = 12, so 12 students voted for chocolate.

$\frac{1}{4}$ of the students like vanilla best. $\frac{1}{4}$ of 24 = 6, so 6 students voted for vanilla.

$\frac{1}{4}$ of the students like strawberry best. So 6 students also voted for strawberry.

SCORE POINT 2
(EXAMPLE A)

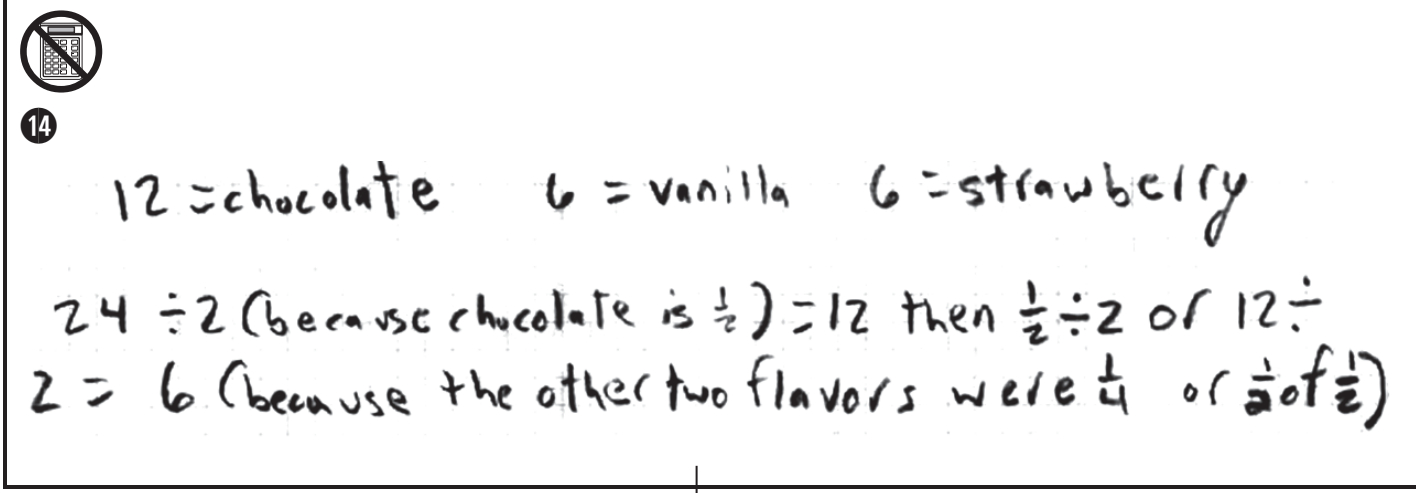
14



Student's answer is correct, with sufficient explanation given.

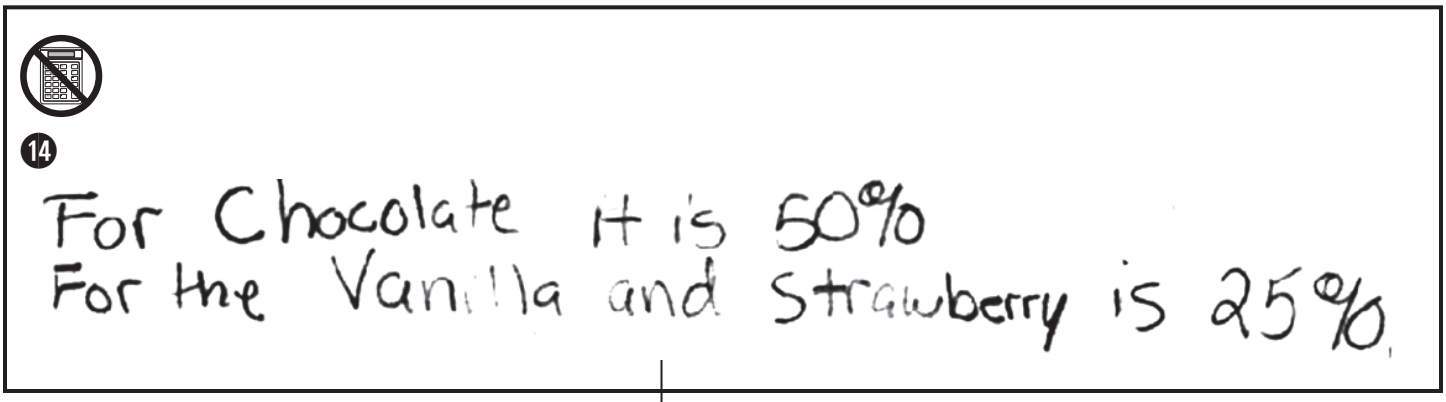
SCORE POINT 2
(EXAMPLE B)

14



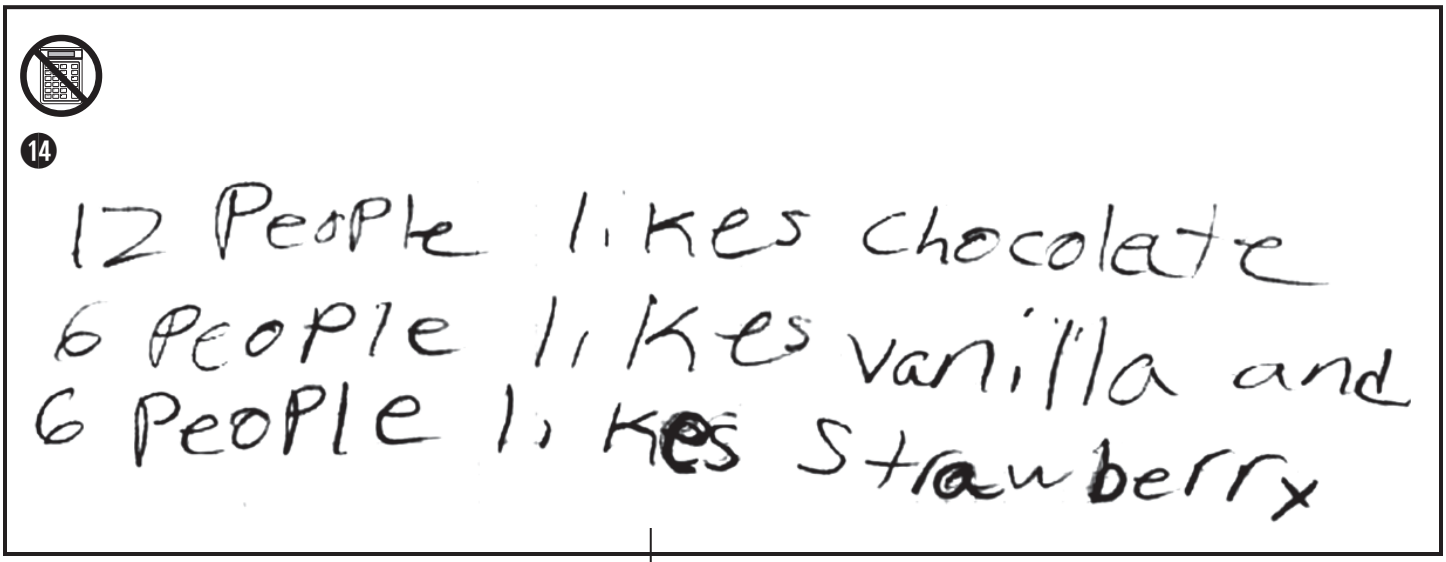
Student's answer is correct, with sufficient explanation given.

Score Point 1
(Example A)



Student indicates the correct percentage for each sector of the graph.

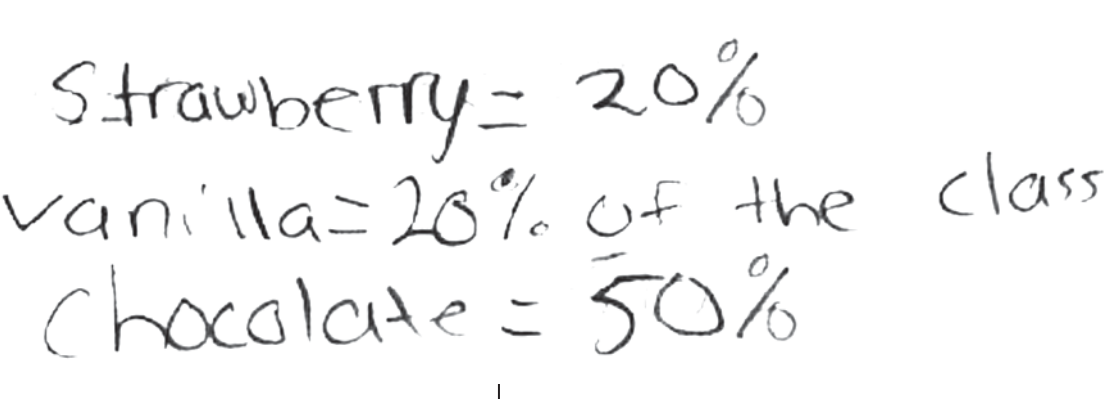
Score Point 1
(Example B)



Student's answer is correct, with no explanation given or work shown.

SCORE POINT 0
(EXAMPLE A)

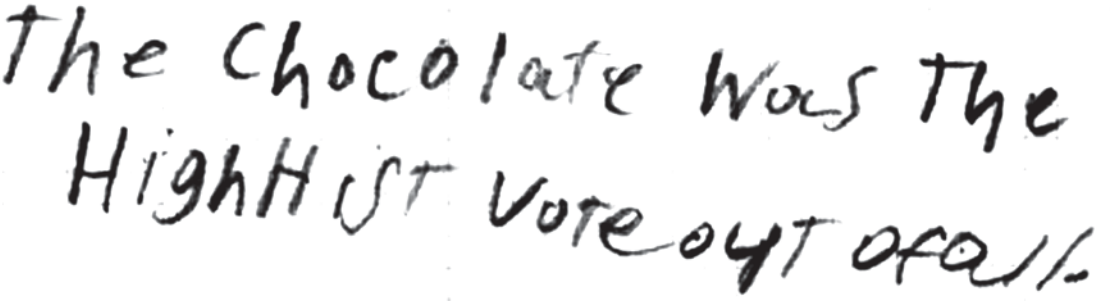
14



Student indicates incorrect percentages for two of the three sectors of the graph.

SCORE POINT 0
(EXAMPLE B)

14



Student's answer is irrelevant to the skill or concept being measured.

N&O 5.4 **Accurately solves problems involving** multiple operations on whole numbers or the use of the properties of factors, multiples, prime, or composite numbers; and addition or subtraction of fractions (proper) and decimals to the hundredths place. (Division of whole numbers by up to a two-digit divisor.) (IMPORTANT: *Applies the conventions of order of operations with and without parentheses.*)

15 The chart below shows the average rainfall in April for four different towns.

Average Rainfall in April

Town	Average Rainfall (in inches)
Fairview	3.35
Milton	4.20
Crawford	3.98
Southport	4.09

a. Which town had the greatest average rainfall?

b. How much more is the average rainfall in Southport than the average rainfall in Fairview? Show your work or explain how you know.

c. The **actual** April rainfall in Fairview this year was 0.8 inch **more than** the average rainfall. What was the actual April rainfall in Fairview? Show your work or explain how you know.

Scoring Guide

Score	Description
4	5 points
3	4 points
2	2 points
1	1 point
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response

Training Notes:

Part a: 1 point for the correct answer, **Milton**

Part b: 2 points for the correct answer, **0.74** (inches), with work shown or explanation given

OR

1 point for the correct answer, with no work shown or explanation given

or

for correct strategy shown in solving the problem, but there may be a computation or transfer error

Part c: 2 points for the correct answer, **4.15** (inches), with work shown or explanation given

OR

1 point for the correct answer, with no work shown or explanation given

or

for correct strategy shown in solving the problem, but there may be a computation or transfer error.

Sample Responses:

Part b: 4.09 – 3.35 = 0.74

Part c: 3.35 + 0.80 = 4.15

SCORE POINT 4
(EXAMPLE A)

15

Milton had the greatest rainfall.

a) Student's answer is correct. (1 point)

3.99
3.35
0.74

Southport has .74 more inches of rain than Fairview.

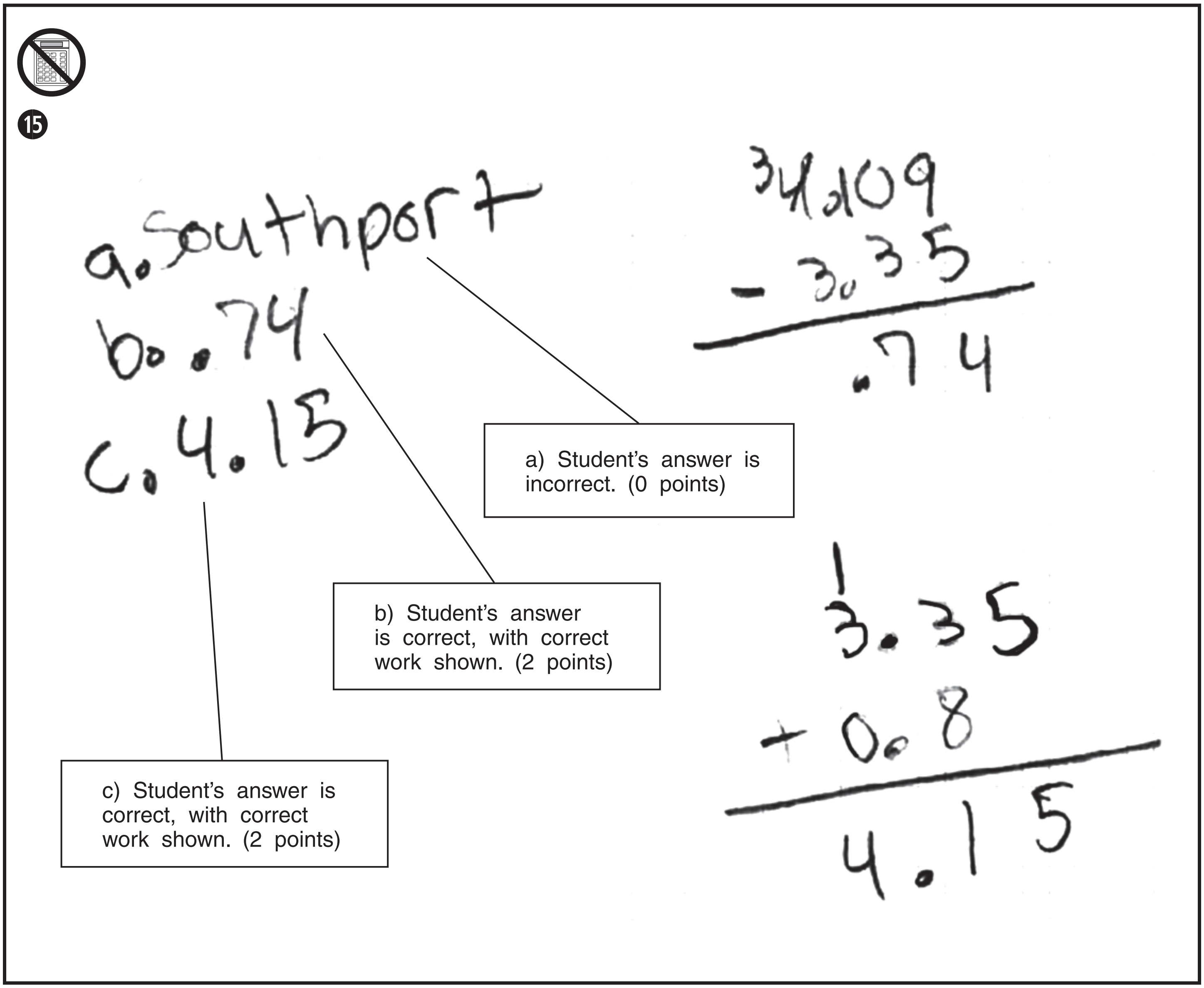
b) Student's answer is correct, with correct work shown. (2 points)

$\overset{1}{3}.35$
0.80
4.15

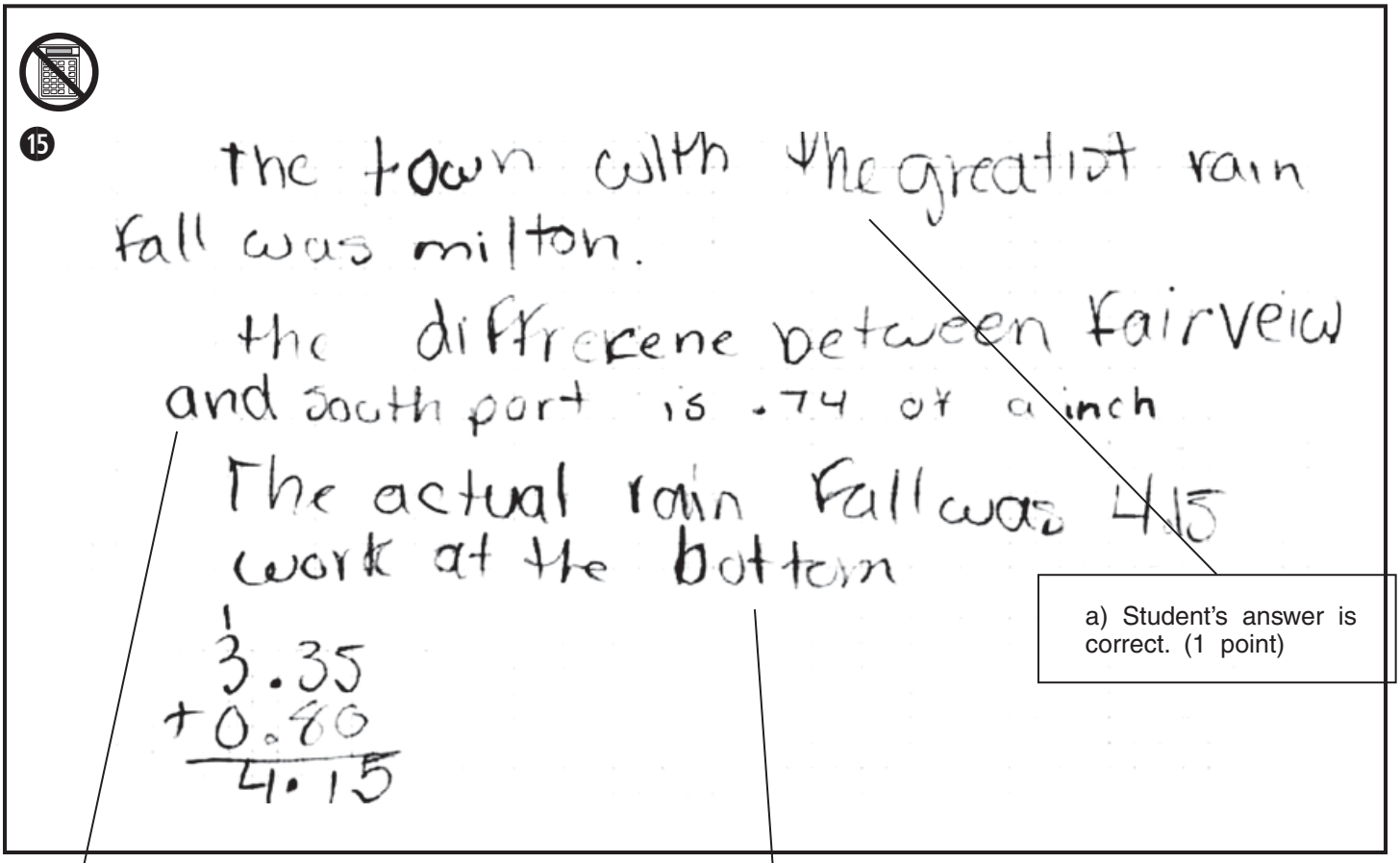
The actual April rainfall in Fairview would be 4.15 inches.

c) Student's answer is correct, with correct work shown. (2 points)

Score Point 3
(Example A)



SCORE POINT 3
(EXAMPLE B)



15

the town with the greatist rain fall was milton.

the diffrecene between fairview and south port is .74 of a inch

The actual rain Fall was 4.15

work at the botton

$$\begin{array}{r} {\scriptstyle 1} \\ 3.35 \\ +\,0.80 \\ \hline 4.15 \end{array}$$

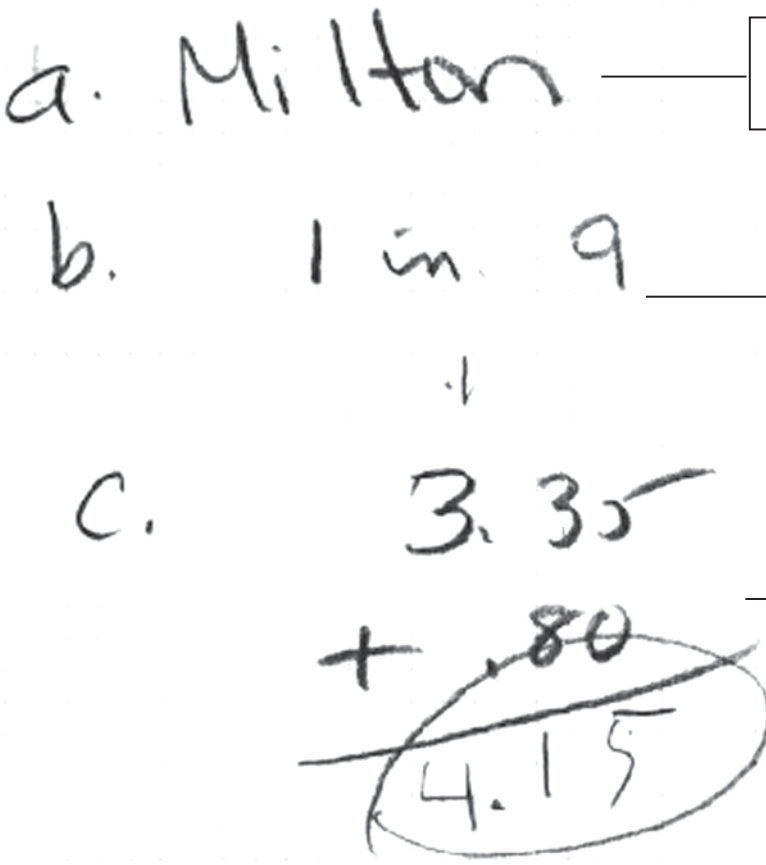
a) Student's answer is correct. (1 point)

c) Student's answer is correct, with correct work shown. (2 points)

b) Student's answer is correct, with no work shown. (1 point)

SCORE POINT 2
(EXAMPLE A)

15



a) Student's answer is correct. (1 point)

b) Student's answer is incorrect, with no work shown or explanation given. (0 points)

c) Student's answer is correct, with correct work shown. (2 points)

SCORE POINT 2
(EXAMPLE B)

15

a. miton

a) Student's answer is correct. (1 point)

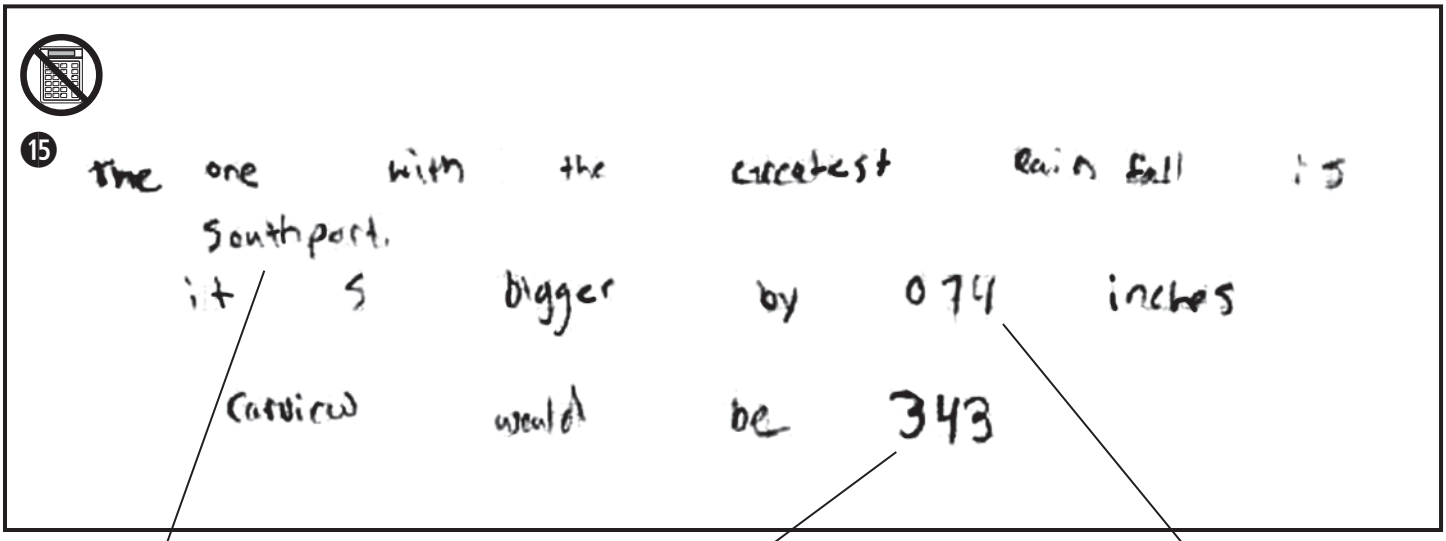
b. .74

b) Student's answer is correct, with no work shown. (1 point)

c. 4.15

c) Student's answer is correct, with no work shown. (1 point)

Score Point 1
(Example A)

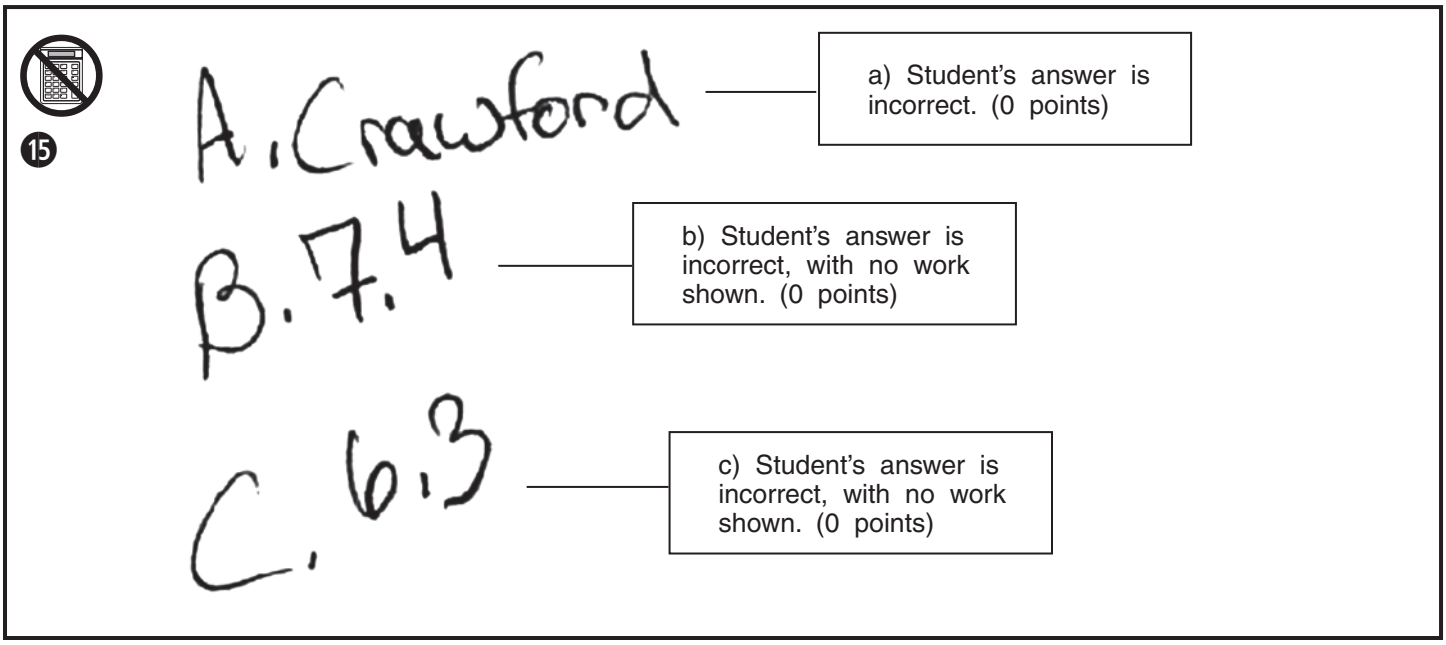


a) Student's answer is incorrect. (0 points)

c) Student's work is incorrect. (0 points)

b) Student's answer is correct, with no work shown. (1 point)

Score Point 0
(Example A)



a) Student's answer is incorrect. (0 points)

b) Student's answer is incorrect, with no work shown. (0 points)

c) Student's answer is incorrect, with no work shown. (0 points)